

SOME NEW SPECIES, NEW COMBINATIONS, AND NEW
RECORDS OF RED ALGAE FROM THE PACIFIC COAST

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The algae described in this paper come from two Pacific Coast areas where intensive collections have been made, the Monterey Peninsula, California (Smith, 1944; Hollenberg and Abbott, 1966) and Coos Bay, Oregon (Doty, 1947). This paper forms a part of a continuing study by the author of red algae, particularly from the Monterey area, and of studies of other new taxa with George J. Hollenberg (Hollenberg and Abbott, 1965; 1966; 1968).

Three species of Delesseriaceae (Ceramiales) are here newly described: *Nitophyllum dotyi* from Oregon, *N. cincinnatum* from California and *Cryptopleura rosacea* from California. *Nitophyllum hollenbergii* (Delesseriaceae) is a transfer from *Myriogramme*. In the Gigartinales, *Ozophora* J. Agardh (Phyllophoraceae) is reinstated with *O. californica* J. Agardh as the type species, and *O. latifolia* and *O. norrisii* as newly described. *Chondrus ocellatus* Holmes (Gigartineae), known from northern Japan, is reported from Sunset Bay, near Cape Arago, Oregon, and is the first species of this genus to be reported from the eastern Pacific since Kylin (1928) removed *Chondrus affinis* Harvey to *Rhodoglossum*.

Specimens without an herbarium abbreviation are at the Hopkins Marine Station. Abbreviations for herbaria are the standard ones and the following ones: GMS, Gilbert M. Smith algae herbarium at the Hopkins Marine Station, and MSD, collection of Maxwell S. Doty, University of Hawaii. Collecting numbers, except where preceded by a name, are those of the author. Color names which are capitalized in the description are those of Ridgeway (1915).

Nitophyllum hollenbergii (Kylin) Abbott, comb. nov. *Myriogramme hollenbergii* Kylin, Acta Univ. Lund. 27(11): 32, pl. 11. 1941.

Nitophyllum is distinguished from *Myriogramme* on very technical grounds. Vegetatively they are for the most part monostromatic and lack veins of any kind except perhaps basally. One of the reproductive differences emphasized by Kylin (1956) is the terminal carpospores of *Nitophyllum*, whereas those of *Myriogramme* are in chains.

The lectotype of *M. hollenbergii*, *Hollenberg 2854*, GMS, which is cystocarpic shows carpospores that are terminal.

Other reference in the literature to *Myriogramme hollenbergii* are Smith (1944), Dawson (1962), and Norris and West 1966).

Distribution: British Columbia, Vancouver I.; Washington, near Smith I., Partridge Bank off Whidbey I. Oregon, Tegula Bay, south of Cape Arago, *Doty 25764*, MSD. Several new collections from Monterey, Cali-

ifornia, were made in the vicinity of the previously known localities (Smith, 1944). Dawson (1962) has reported this species from La Jolla, California, and Isla Magdalena, Baja California.

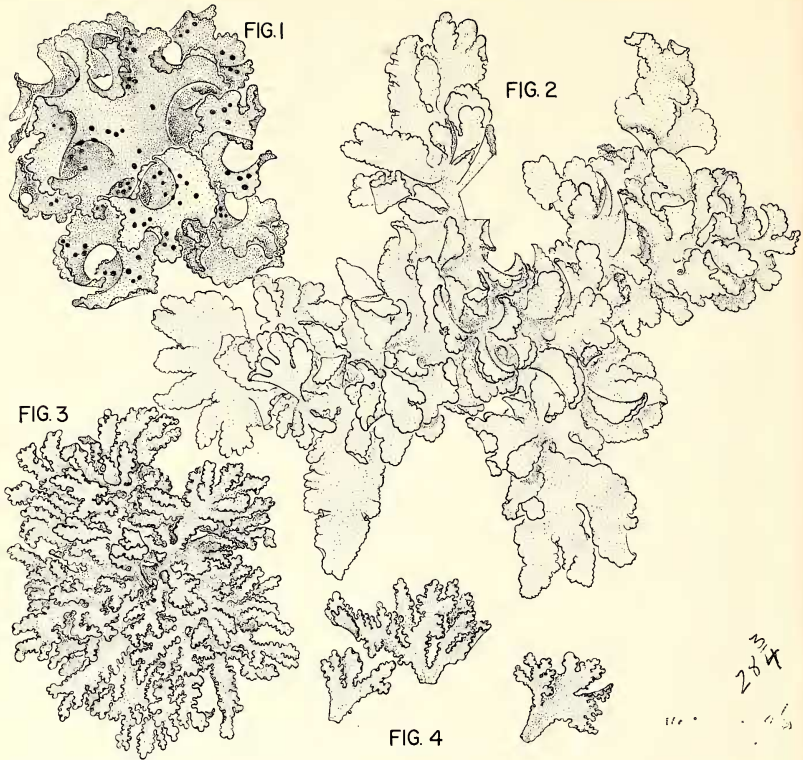
Nitophyllum cincinnatum Abbott, sp. nov. Fig. 1. Thallus (in algis corallineis) epiphyticus, membranaceus, per hapteron parvum, et secundo gradu per extensiones paxilliformes cellularum thalli inferiorum affixus, usque ad 6 cm alt., lobatus, lobis in circulis cristatis aggregatis, omni lobo cuneato, latitudine apicum aequa altitudinis thalli aut dimidio brevior; interdum prolifero, marginibus crebre corrugatis, corrugationibus crispatis, et undulatis et fimbriatis. Thallus monostromaticus, sine venis microscopicis, rubro-purpureus. Cystocarpi 1.0–1.5 mm diam., gonimoblastus sporas unicas terminales, $25\text{--}28 \times 12\text{--}15 \mu$ habens. Sori tetrasporangiales c. 0.5 mm diam., longiores quam lati, in centro altiores quam ad margines.

Thallus epiphytic on corallines, membranous, attached by a small holdfast and secondarily by occasional peg-like extensions of the lower thallus, up to 6 cm high, lobed, lobes occurring in circular to trumpet-shaped groups, each lobe cuneate, the width of the tops equal to or one-half the height, occasionally proliferous, with densely ruffled margins, the ruffles crisp, both undulate and fimbriate. Thallus monostromatic, with no microscopic veins. Color when fresh reddish-orange (Russet Vinaceous to Sorghum Brown), reddish purple when dry (Deep Corinthian Purple). Cystocarps 1.0 to 1.5 mm across, gonimoblast with single terminal spores, 25–28 by 12.5 μ . Tetrasporangial sori about 0.5 mm in diameter, longer than wide, and center higher than at the edges.

Holotype: California, Monterey County, cast ashore at the south end of Carmel Beach, *Abbott 2029*, May 12, 1961, GMS, 6 specimens tetrasporangial, 2 cystocarpic on 1 sheet.

Other specimens: California, San Mateo Co., attached at 15 ft lepth off Moss Beach, *4130*, on *Calliarthron*; Monterey Co., at 20–25 ft depth off Whaler's Cove, Pt. Lobos State Reserve Park, *4135*, on *Calliarthron*; Monterey Co., *4138*, US; *4129*, WTU; *4141*, UC; *4134*, UCSB; *4130*, MSD; *4131* MSD.

Nitophyllum cincinnatum is named for the deep ruffling and curling of the thallus. When first collected, it seemed to match the description of *N. mirabile* Kylin (1925) from the Friday Harbor region, but an examination of specimens of that species showed that the deep ruffling and size of the new species were different from the northern species. *Nitophyllum mirabile*, further, is a relatively flat blade with undulate margins, whereas *N. cincinnatum* is funnel or trumpet shaped, resembling in form the medusoid genus *Haliclystus*. As described, it is the only species of *Nitophyllum* of this shape on this coast, *N. mirabile* being a broad flat blade with ruffled margins, *N. northii* strap-shaped without ruffles, and *N. hollenbergii* small broad blades, without a modified margin.



FIGS. 1-4. *Nitophyllum* sp. and *Cryptopleura rosacea*: 1. habit of *Nitophyllum cincinnatum* showing cystocarps on the crisp, ruffled lobes of the thallus, $\times \frac{3}{4}$; 2. *Nitophyllum dotyi*, the type specimen which is a cystocarpic thallus, $\times \frac{3}{4}$; 3-4, *Cryptopleura rosacea*; 3, habit of *Abbott 4190*, the type specimen, showing the lobes arranged in clumps which are characteristic of this species, $\times \frac{1}{2}$; 4, three segments in detail, showing dense ruffling on margins, $\times 1$.

Nitophyllum dotyi Abbott, sp. nov. Fig. 2. Thallus 8 cm alt., membranaceous, roseus, in aliquot lobos primarios divisu, omni lobo ad dimidui altitudinis loborum primariorum vicissim divisu, marginibus undulatis proliferisque. Thallus omnio monostromaticus, nisi ad basem, sine venis micro-aut macroscopicis. Cystocarpi 300-500 μ lat., carposporae terminales, ellipticae ad obovatas, 1.5-2.0 plo longiores quam latae. Tetrasporangia spermatangiaque non visa.

Thallus 8 cm tall, membranaceous, rose-red (Rocelin Purple to Deep Helebore Red), divided into several primary lobes, each lobe divided again to one-half the depth of the primary lobes, the margins undulate and proliferous. Monostromatic except basally, without microscopic veins. Cystocarps 300-500 μ wide, carpospores terminal, 45-60 by 30 μ , elliptical to obovate, up to twice longer than broad. Tetrasporangia and spermatangia not seen.

Holotype: Oregon, Coos Co., Lighthouse Beach, Cape Arago, *Ethel I. Sanborn*, July 11, 1926, UC552380. Regretfully known only from the holotype, this species can be placed without question in this genus, as each procarp contains only one carpogonial branch and one group of sterile cells, the carpospores are terminal, and the thallus is without veins.

It differs from the other *Nitophyllum* species on this coast by being larger, more lobed, and more strongly proliferous. In fact, this species resembles some of the proliferous forms of *Hymenena setchellii* more than it does any species of *Nitophyllum*, but lacks the microscopic veins present in *Hymenena*, and is a more delicate thallus.

Nitophyllum dotyi is named in honor of Maxwell S. Doty of the University of Hawaii in recognition of his major contribution to the knowledge of the Oregon marine algal flora, and the marine flora of the Pacific Coast.

Cryptopleura rosacea Abbott, sp. nov. Figs. 3, 4. Thalli 5–10 cm alt. lobos taeniaformes flabellato et ramosos, qui segmenta taeniaformia 2–3 cm long. ferunt, habentes; margines segmentorum crebre crenati, omni crena c. 0.5 cm long. cacumina obtusa ad spatulata habente. Partes inferiores venas macroscopicas non perspicuas, partes superiores venas microscopicas praebentes. Partes thalli inferiores polystromaticae, partes superiores et margines monostromaticae. Cystocarpi per loborum superficiem sparsi, carposporas terminales habentes.

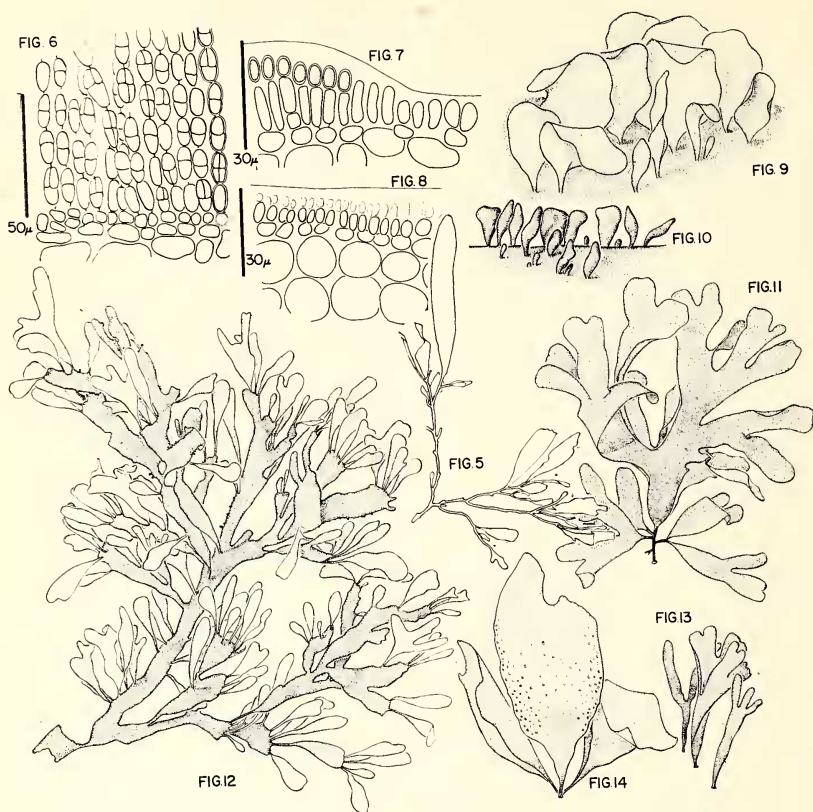
Thalli 5–10 cm tall, in a crisp clump, with branched flabellate, ribbon-like lobes bearing ribbon-like segments 2–3 cm long, with densely scalloped margins, each scallop about 0.5 cm long, segments with blunt to spatulate tips. Thallus a deep rose-red (Indian Lake to Dahlia Crimson). Lower portions with indistinct macroscopic veins, upper portions with microscopic veins. Lower portions of thallus polystromatic, upper portions and margins monostromatic. Cystocarps few in the main segments, 1.0–1.5 mm wide, somewhat flat; gonimoblasts with terminal carpospores.

Holotype: California, Monterey Co., east ashore at the south end of Carmel Beach, *Abbott 4190*, May 5, 1965, GMS.

Other specimens: From the type locality, *4191*, May 19, 1965, UC; *4192*, June 19, 1965; *4193*, April 25, 1965; *4194*, May 7, 1966.

In general form, this newly described species of *Cryptopleura* resembles the illustration of *C. dichotoma* Gardner (1927) but Gardner's description of size of thallus, width of blades, branching of segments, character of the margins and color of the thallus is different from these in *C. rosacea*, the latter species being taller, having wider blades, branches flabellate, with ruffly margins, and of a brighter color. Since *C. dichotoma* is known only from the type specimen, no further comparisons can be made.

Cryptopleura rosacea is smaller and a more splendor species than *C. lobulifera* or *C. brevis*, as well as differing in color, width of segments



FIGS. 5-14. 5-12, *Ozophora* species; 5, habit of *Ozophora clelandii* (the type specimen of *Phyllophora clelandii*), showing prominent stipes and linear blades characteristic of this species, $\times \frac{1}{2}$; 6, tetrasporangial nemathecia of *O. clelandii* showing chains of tetrasporangia arranged in a nemathecium on the surface of the thallus; 7, monosporangia of *O. clelandii*, arranged in a nemathecium on the surface of the thallus; 8, spermatangial sorus of *O. latifolia*, occurring on special leaflets; 9, spermatangial leaflets which occur in clusters near the midline of the blades of the thallus of *O. clelandii* (similar in other species of *Ozophora*), $\times 1$; 10, cystocarpic papillae of *O. clelandii*, $\times 1$; 11, habit of the type specimen of *O. latifolia*, showing broad flabellae dichotomously branched, and an inconspicuous stipe, both characteristic of this species, $\times \frac{1}{3}$; 12, habit of cystocarpic thallus of the type specimen of *O. norrisii*, showing repeated branching, the last orders of branches with slender, delicate stipes which are characteristic of this species. Basal portion missing, $\times \frac{1}{3}$; 13-14, *Chondrus ocellatus*; 13, erect, tufted, little-branched, furrowed thalli known as *C. ocellatus* f. *parvus* which resemble *Rhodoglossum affine*, $\times \frac{7}{8}$; 4, broad, short, blade-like form close to *C. ocellatus* f. *ocellatus* and resembling depauperate specimens of *Iridaea flaccida*, $\times \frac{7}{8}$.

and density of ruffling of the margins. It appears to be a subtidal species, as it has not been collected intertidally.

OZOPHORA J. Agardh (1892) with *O. californica* as the only species, was described from the Golden Gate (San Francisco) California, and was transferred by Kylin (1931) to *Phyllophora*. Dawson (1961) restricted the northern specimens described by Smith (1944, as *Phyllophora clevelandii* Farlow) to *P. californica*, reserving for the specimens from Santa Barbara south the name of *P. clevelandii*. Examination of the type specimen of *O. californica* in the Agardh herbarium shows the cystocarpic material to be identical with the more recently collected material in the northern California area. Richard E. Norris of the University of Washington some years ago called to my attention the peculiar spermatangial leaflike proliferations of this entity. Detailed studies of these and other reproductive structures show that these specimens cannot be allied with *Phyllophora* where the spermatangia occur in cavities on the surface of the thallus, and where the cystocarps are borne on leaflike proliferations. It therefore seems advisable to present a more adequate description of *Ozophora*.

Thallus erect, with one to several fronds arising from a disc-like holdfast, with or without several cylindrical stipes, upper portions producing irregularly linear to wedge-shaped blades with stipes, or branching dichotomously in blade-like segments; if not stipitate, then main axis and subsequent branches blade-like, sometimes with proliferous stipitate bladelets and ultimately forming broad, blunt tips. New growth and regeneration common in various parts of the thallus, at first appearing as small ear-like lateral proliferations. Medulla parenchymatous, with a narrow 2-3 layered cortex. Spermatangia in thin cordate leaflets clustered on the surfaces of the thallus, toward the mid-line, or marginal, the spermatangia occurring in a colorless superficial band on the surface of the leaflets. Cystocarps in simple cylindrical or fusiform proliferations (papillae) the cystocarps bulging out the median portion on the proliferations. Carpospores small, in clusters separated by sterile filaments. Asexual thalli with monospores (undivided tetraspores?) in superficial blisters or in small marginal warts. Tetrasporangia in surface nemathecia, the sporangia in chains, cruciately divided.

Ozophora is clearly related to *Phyllophora* on the basis of the vegetative structure, having a parenchymatous medulla and narrow cortex, and in reproduction, having tetrasporangia in superficial nemathecia, the tetrasporangia (fig. 6) borne in chains. These characters are also shared with *Petroglossum* Hollenberg (1943). *Petroglossum* differs from *Phyllophora* in having spermatangial sori continuous with the surface of the thallus and although spermatangial sori are continuous (fig. 8) in *Ozophora*, they are in special (fig. 9) leaflets, whereas in *Phyllophora*, in contrast, spermatangia are in pit-like cavities. *Petroglossum* and *Phyllophora* bear cystocarps in leaflets; *Ozophora* has cystocarps (fig. 9)

in papillae. If the asexual sori of the three species of *Ozophora* are sometimes monosporangial (assuming that these are not undivided tetrasporangia), these are suggestive of the modified life cycle shown by *Ahnfeltia plicata* in the Phylloporaceae.

Ozophora clevelandii (Farlow) Abbott, comb. nov. Figs. 5, 6, 7, 9, 10. *Phyllophora clevelandii* Farlow, Proc. Amer. Acad. Arts 2: 368. 1875. *Ozophora californica* Agardh, Analecta algologica, 82. 1892. *Phyllophora californica* (Agardh) Kylin, Acta Univ. Lund. 27(11): 34, pl. 20, fig. 50. 1931. *Phyllophora submaritimus* Dawson, Allan Hancock Found. Publ. Occas. Pap. 8: 6, figs. 17, 18. 1949.

Thalli 10–28 cm high, frequently overgrown by encrusting bryozoans, hydroids, and barnacles, several cylindrical wiry stipes (fig. 5) up to half the height of the thallus arising from a disc-shaped, woody holdfast, the linear or spatulate blades occasionally furcate, on short stipes if on the second or third order of branches, blades 0.5 to 2.0 cm wide, up to 15 cm long, occasionally proliferous (regenerative) at the tips, which are otherwise blunt. Cystocarps on papillae (fig. 10) borne on the central portion of both surfaces of the blades, sometimes spreading to the margins but not marginal; spermatangial leaflets in clusters (fig. 9) at the center of the blades; monosporangia (fig. 7) (undivided tetrasporangia?) in blister-like nemathecia on the surface of the blades; tetrasporangia (fig. 6) in superficial nemathecia, in chains, cruciately divided.

Holotype of *Ozophora californica*: California, San Francisco, from the Golden Gate, no. 25365, LD, a fragmented thallus which is cystocarpic. Another specimen, no. 25364, LD, from Unalaska, is said to be this species but it is too fragmentary to identify.

Holotype of *Phyllophora clevelandii*: California, San Diego Co., San Diego, *Daniel Cleveland*, Dec. 1874, FH.

Other specimens: California, Marin Co., cast ashore at Duxbury Reef, 4216, Dec. 27, 1967; Santa Cruz Co., cast ashore at Davenport, *Hair & Nicholson*, July 16, 1965; Monterey Co., *Hollenberg 3934*, July 16, 1939; cast ashore at Moss Beach, 4177; 4178, MSD; 4179; 4209; cast ashore 3 miles north of San Simeon, 4180, GMS, UC, WTU; 4181, GMS, MSD, UCSB; San Luis Obispo Co., cast ashore at Shell Beach, 4183, June 4, 1966; 4184, Oct. 22, 1967, GMS, MSD.

Additional references to *Ozophora clevelandii* are Smith (1944) and Dawson, 1949. Additional references to *Phyllophora californica* are Dawson (1958; 1961).

Distribution: from Duxbury Reef, Marin Co., through central California, Channel Islands, and reported by Dawson (1961) from several Pacific Mexico localities.

Ozophora clevelandii is usually collected in the drift, and there usually as fragments. Such specimens usually resemble various forms of *Prionitis*, particularly *P. andersonii*, and without experience with these two taxa would be easy to confuse with the latter. Likewise, *O. latifolia*

(described below) is also found cast ashore, but except for possible confusion with *Rhodymenia pacifica*, is more easily defined as a separate entity from other red algae. In part, these associations are a reflection of the main differences between these two species of *Ozophora*, namely, that the conspicuous cylindrical stipes (fig. 5) with broadly linear blades of *O. clevelandii* remind one of *Prionitis* and the broad foliar segments of *O. latifolia* (with basal portions lacking) remind one of *Rhodymenia pacifica*. The intact thalli of *O. latifolia* (fig. 11) obtained by dredging or diving show only very short stipes less than 2 cm high, whereas stipes may be one-half the total height of the thallus in *O. clevelandii*. Because more collections are now available than when Dawson (1949, 1961) drew up his descriptions of the southern California and Pacific Mexico *Phyllophora* species, it is clear that on vegetative grounds *Phyllophora submaritimus* Dawson is the same as *Ozophora clevelandii* although no fertile material of the southern taxon is known.

The holotype of *Phyllophora clevelandii* (fig. 5) bears that designation in the hand and initials of F. S. Collins. It is represented by two bleached, sterile specimens, obviously parts of the same thallus. On the same sheet is another specimen, different from these two and bearing tetrasporangia (fig. 6) in chains. Two packets are also on this sheet, one from Santa Cruz collected by C. L. Anderson is also tetrasporangial; the second, from San Francisco, collected by N. L. Gardner is cystocarpic. The tetrasporangial nemathecia are oval and on the surface of the thallus, and resemble the nemathecia which bear monosporangia of the more recently collected thalli. The cystocarps of the Gardner specimen are in fusiform proliferations or papillae similar to those of the type specimen of *Ozophora californica*. Although sterile, the type specimen of *Phyllophora clevelandii* is of the shape, size, and structure of the specimen illustrated by Smith (1944), which is accepted here as identical.

Phyllophora clevelandii is described by Dawson (1961) as having tetrasporangia on small leaflets borne on the surface of the blades; since these are borne in a different place than the reported monospores and tetrasporangia borne in nemathecia on the surface of the thallus in *Ozophora*, it is concluded that some of his specimens are different from *O. clevelandii*, and thus probably not *Ozophora*.

Ozophora latifolia Abbott, sp. nov. Figs. 8, 11. Thallus usque ad 30 cm alt., cum aut sine stipite brevi cylindrico; axis principalis complanatus, laminiiformis, 2.5–3.0 cm lat. irregulariter ad regulariter dichotome flabellate ramosus, aut segmenta prolifera stipitata 7–10 cm long., 1.0–2.0 cm lat., e margine axis principalis producta, habens. Sectiones transversae complanatae, medullam achromaticam parenchymatiformem et filamenta corticalia photosynthetica, e 3–4 stratis constantia, habentes. Spermatangia in proliferationibus cordatis laminiiformibus, in fasciculis in superficie segmentorum ordinatis, spermatangiis superficie proliferationum complanatis. Cystocarpi in proliferationibus e superficie laminarium

cylindricis ad fusiformes ad teretes, simplicibus aut semel-ramosis facti, massa carposporarum media, inflationem parvam efficiente. Thalli asexuales monosporici, monosporae (tetrasporae no divisae?) in excrescentiis marginibus, aut in nematheciiis pustuliformibus in segmentis factae.

Thallus up to 30 cm tall, brick red when fresh, drying to a rusty-red, with or without a short, cylindrical stipe less than 2 cm high, main axis flattened and blade-like, 2.5 to 3.0 cm wide, irregularly to regularly dichotomously flabellately branched (fig. 11), or with stipitate proliferous segments 7–10 cm long and 1.0 to 2.0 cm wide produced from the margin of the main axis. Cross sections flattened, with a colorless parenchyma-like medulla and photosynthetic cortical filaments of 3–4 layers. Spermatangia in pink cordate leaflike proliferations 1–2 mm high and 1–3 mm broad, arranged in clusters on the surface of the segments, the spermatangia forming a continuous, colorless band (fig. 8), on the surface of the leaflets. Cystocarps borne in simple or once-branched cylindrical to fusiform and terete proliferations (papillae), 1 to rarely 2 mm high, from the surface of the blades, and occasionally fringing the margins; carpospore mass median in section, and making a small swelling in the proliferation, internally filling the entire center of the medulla. Carpospores small and ovate, about 10 by 7 μ arranged in small clusters separated by sterile filaments. The asexual thalli monosporangial, monosporangia (undivided tetrasporangia?) produced in marginal outgrowths, or in blister-like nemathecia on the segments (branches of the second order).

Holotype: California, Monterey Co., dredged at 50–60 ft depth, north of Coastguard breakwater off Monterey, *Abbott 4172*, July 31, 1964, GMS, spermatangial and cystocarpic plants on 1 sheet.

Other specimens: Oregon, Lincoln Co., from Seal Rocks, *Doty 2664*. California, San Mateo Co., at 10 ft depth off Pigeon Pt, *4146*; Monterey Co., 29 specimens variously distributed to: GMS, MSD, UC, UCSB, US, WTU; San Luis Obispo Co., Shell Beach, 3 specimens distributed to: GMS, MSD, WTU; Santa Barbara Co., Santa Barbara, *Peattie 28*, SBM.

Thalli of *O. latifolia* are taller, the segments longer and broader and more branched than those of *O. clevelandii*. The chief differences are in the possession of longer and more prominent stipes and linear blades of the latter species.

Ozophora latifolia is named for its broad axis, blades and thallus segments.

Ozophora norrisii Abbott, sp. nov. Fig. 12. Thalli subaestuales, usque ad saltem 20 cm alt. (thallo altissimo fracto), hapteron discoideum parvum, stipitem delicatum, et axem principalem foliarem habentes; axis principalis axe secundarios latitudine quasi aequos, ad tertiam quartamque ordinem conferte ramosos, pinnatim irregulariterque efficiens.

Laminae proliferae simplices ad spathulatas ad divaricate furcatas, in omni ordine ramificationis, 1–3 cm long., ad 1 cm lat., in stipitibus delicatis tenuibusque sitae. Cystocarpi in papillis secundum margines orientibus siti; foliola spermatangialia marginalia; monosporangia in nematheciis pustuliformibus in superficie laminarum orientibus sita.

Thalli up to at least 20 cm tall, from a small discoid holdfast and a delicate stipe, with a foliar main axis which gives rise pinnately, flabellately, and irregularly to secondary axes of nearly the same width, and branching closely to the third and fourth order. Simple to spathulate to divaricately forked proliferous bladelets on all orders of branching, 1–3 cm long, up to 1 cm wide, on delicate slender stipes. Cystocarps on papillae borne along the margins; spermatangial leaflets marginal; monosporangia (undivided tetrasporangia?) in blister-like nemathecia on blade surfaces.

Holotype: Washington, San Juan Co., dredged in 40 ft depth Partridge Pt., west of Whidbey I., *Norris 4952*, July 27, 1964, GMS-holotype, WTU.

Other specimens: Washington, San Juan Co., dredged off Salmon Bank, southwest of San Juan I., *Norris 4803*, July 16, 1964, WTU, spermatangia; *Norris 5167*, Feb. 13, 1965, cystocarpic; at type locality, *Norris, 5214*, July 6, 1965, cystocarpic, spermatangial, sporangial, dredged in 30–35 ft.

Ozophora norrisii has a thinner thallus than the other two species in the genus. It also branches more profusely, the third and higher orders of branches being distinguished by very delicate stipes. Furthermore, spermatangial leaflets are marginal in location. In general form, it is similar to *Petroglossum pacificum* Hollenberg (1943, fig. 4) but 3–4 times the size of this species, and lacks the crustose base of *Petroglossum pacificum*. With *O. latifolia*, it shares a short, inconspicuous stipe.

Ozophora norrisii is named in honor of Richard E. Norris of the University of Washington who first called attention to the peculiar reproductive structures of this genus.

CHONDRUS OCELLATUS Holmes f. PARVUS Mikami, Sci. Pap. Inst. Algol. Res. Fac. Sci. Hokkaido Imp. Univ. 5: 233, pl. 3, fig. 1. 1965. Fig. 13, 14.

Thalli saxicolous, olive green to brown, tufted in two growth forms, one (fig. 13) 0.5 to 1 cm high from a short, stout holdfast and stipe, upper portion of flabellae dichotomously branched once or twice, furrowed with blunt, obtuse tips, but otherwise smooth, with edges raised at the margins; the other (fig. 14) type foliar, with almost no stipe to stipes of 1 cm high, the blades expanding and 2.5 to 3 cm broad, with broad rounded tips, and up to 5 cm high.

Monoecious. Spermatangia produced laterally near the tips of the cortical filaments, less than 2 μ wide. Cystocarps up to 1 mm wide, scattered over the median portions of the blades, internally with no "Faser-

hulle" (special medullary filaments which surround the cystocarp). Tetrasporangia arising from accessory branches of the medullary filaments, 28 by 35 μ associated in flat to ovate internal sori.

Distribution: Oregon, Coos Co., at 3.5–4 ft tide level, below *Endocladia* zone, Sunset Bay, near Cape Arago, Norris 5359, July 20, 1967, GMS, MSD, WTU. The Japanese locality for this form is Shimonoseki, Yamaguchi Prefecture, south central Japan. Forma *ocellatus* is found throughout Honshu and its type locality is Shimoda, Shizuoka Prefecture.

Chondrus, as understood by modern workers, is not known on the Pacific Coast of North America, previous reports having been shown to be species of *Rhodoglossum* and other genera. Therefore, to find a representative of *Chondrus*, and to be able to ally it with a known species is rather a surprise. Although these specimens, on casual inspection, resemble *Rhodoglossum affine* and depauperate *Iridaea* specimens, close study of the reproductive structures shows conclusively that this is a species of *Chondrus*. The two strongest characteristics shown are: no "Faserhulle" which is present in the 3 other genera of Gigartinaceae on this coast, namely, *Rhodoglossum*, *Gigartina* and *Iridaea*; and tetrasporangia arising from accessory branches of the medullary filaments, which only *Iridaea* of the other genera shares. The specimens show a remarkable resemblance to those illustrated in Plate 3, fig. 1 of Mikami (1965), and some of them grade into what Mikami (1965) considers to be f. *ocellatus*, being somewhat taller and more robust than the average for f. *parvus*.

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A NEW NAME FOR A SPECIES OF POLYPODIUM FROM NORTHWESTERN NORTH AMERICA

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A biosystematic study of the *Polypodium vulgare* complex in the Pacific Northwest (Lang, 1965) has shown that there are three cytotypes present in the area from Alaska south along the Pacific Coast to central California and east to the Rocky Mountains that are apparently involved evolutionally with each other.

One, represented by *P. glycyrrhiza* D. C. Eaton, is uniformly diploid ($n = 37$) throughout its range and is morphologically, ecologically, and geographically distinct from another species in the area, *P. hesperium* Maxon.

Cytological investigations on *P. hesperium* have shown that this species is composed of two cytotypes, one diploid ($n = 37$) and one tetraploid ($n = 74$) (Evans, 1963; Knobloch, 1962; Lang, 1965; Lloyd, 1963, Manton, 1950).